Fact Sheet

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Deep Draft Navigation Underkeel Clearance Study (DDNav)

Purpose: To develop safer and more economical coastal entrance channel designs by improving channel depth design guidance.

Background: The next generation of ships will require deeper drafts and more costly dredging to maintain coastal entrance channels to insure safe navigation. Underkeel clearance (UKC) is the required minimum distance between the ship's keel and the bottom of the channel. The UKC is a function of the ship size and hydrodynamic characteristics, the channel cross-section and shape, and the ship speed. Since every foot of dredging costs millions of dollars, considerable savings can be realized if the UKC can be safely reduced.

Facts: In FY98 the Coastal and Hydraulics Laboratory began a program to improve the UKC requirements through a series of field and laboratory measurements of 6 degree of freedom (DOF) ship motions for a range of entrance channel configurations, ship, and wave conditions. Field data were collected for a variety of ships in the entrance channels at Barbers Point, HI, and Charleston, SC, using Global Positioning Systems (GPS). Laboratory data were collected in a 1:75 scale of the Barbers Point and Charleston entrance channels using a state-of-the-art motion analysis system (MOTAN) of accelerometers and angular rate sensors for surge, sway, heave, roll, pitch, and yaw. The goal of this data collection is to use this information to validate a probabilistic design tool CADET (Channel Analysis and Design Evaluation Tool) for predicting UKC for different wave, ship, and channel combinations. The CADET program was developed by the Naval Surface Warfare Center (NSWC) under contract. Plans are to also use these data and CADET model with proposed future work to improve CHL's ship simulator for use in design of coastal entrance channels exposed to waves.

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